

1 ABSTRACT

2 An improved optical photolithography system and method provides predetermined
3 light patterns generated by a direct write system without the use of photomasks. The Direct
4 Write System provides predetermined light patterns projected on the surface of a substrate
5 (e.g., a wafer) by using a computer controlled means for dynamically generating the
6 predetermined light pattern, e.g., a spatial light modulator. Image patterns are stored in a
7 computer and through electronic control of the spatial light modulator directly illuminate the
8 wafer to define a portion of the polymer array, rather than being defined by a pattern on a
9 photomask. Thus, in the Direct Write System each pixel is illuminated with an optical beam
10 of suitable intensity and the imaging (printing) of an individual feature is determined by
11 computer control of the spatial light modulator at each photolithographic step without the use
12 of a photomask. The Direct Write System including a spatial light modulator is particularly
13 useful in the synthesis of DNA arrays and provides an efficient means for polymer array
14 synthesis by using spatial light modulators to generate a predetermined light pattern that
15 defines the image patterns of a polymer array to be deprotected.